Remarks

Support for the amendments

Examiner will immediately see that the claims as amended are fully supported by the Specification as filed. The amendment to the section *Cross references to related applications* merely restores material that was in the PCT application as originally filed. The restored material fully identifies USSN 10/018,696 and properly incorporates it by reference. USSN 10/018,606 was published March 6, 2003 as U.S. patent application publication 2003/0046212. The amendment to paragraph [0247] merely provides more specific information concerning manufacturers and trademarks. The amendments to the drawings do nothing more than make them legible.

Traversal of the rejection under 35 U.S.C. 101

As stated in Deputy Commissioner John J. Love's memorandum of January 7, 2009 titled *Guidance for Examining Process Claims in view of "In re Bilski"*, the current patent subject matter eligibility guidelines of MPEP 2106 remain in force except that a method claim is statutory if it is "(1) tied to a particular machine or apparatus or (2) transforms a particular article to a different state or thing." Examiner has rejected Applicants' claims as being directed to a mathematical algorithm. For such rejections, the relevant portion of the MPEP is MPEP 2106.2, rev.6, Sept. 2007. When MPEP 2106.2 and the Jan. 7 2009 are applied to Applicants' claims, it will be immediately seen that Examiner's rejection of Applicants' claims under 35 U.S.C. 101 is without basis.

Beginning with the Jan. 7 memo, a method claim is statutory if it is "tied to a particular machine or apparatus" Each of Applicants' independent claims sets forth that "historic returns data for the assets [are] stored in storage accessible to a processor" and that the method steps are "performed in the processor". The claims are thus all "tied to a particular machine or apparatus". With Applicants' claims, there remains the issue of whether they are not statutory because they are directed to a mathematical algorithm. MPEP 2106.2 states that:

> In practical terms, claims define nonstatutory processes if they:

> – consist solely of mathematical operations without some claimed practical application (i.e., executing a "mathematical algorithm"); or
> – simply manipulate abstract ideas, e.g., a bid (*Schrader*, 22 F.3d at 293-94, 30 USPQ2d at 1458-59) or a bubble hierarchy (*Warmerdam*, 33 F.3d at 1360, 31 USPQ2d at 1759), without some claimed practical application.

Applicants' claims perform mathematical operations, but do so in order to "analyze a set of assets" (claim 1), "optimize" the set of assets, (claim 4), or "select" them (claim 10). The results of the methods of the claims are "the probability [that at least one of the selected assets will not provide the desired minimum return indicated for the asset]" (claim 1), "determining weights of the assets in the set such that the worst-case value of the set of assets is optimized over the set of scenarios" (claim 4), and "optimizing the weights of the assets in the selected set [of assets]" (claim 10). Applicants' claims are thus clearly directed to methods which have a practical application.

Applicants' claims thus satisfy the requirements of both the Jan. 9 2009 memo and of MPEP 2106.2. That being the case, the claims are directed to statutory subject matter and Examiner's rejection of claims 1-35 under 35 U.S.C. 101 is without basis.

Traversal of the art-based rejections

Examiner rejects claims 1,4,6-10, and 13-26 under 35 U.S.C. 102(e) as anticipated by Bernhardt, claims 1-35 under 35 U.S.C. 102(e) as anticipated by Eapen, and claims 5, 11, 12, and 28-33 under 35 U.S.C. 103 as obvious over the combination of Bernhardt with Columbus. The rejections under 35 U.S.C. 102 require that the reference under which the claim is rejected show all of the limitations of the claim being rejected. The rejections under 35 U.S.C. 103 require that the combination of references show all of the limitations of the claims being rejected. In the following, Applicants will first set forth what they are claiming and will then demonstrate that neither Bernhardt, nor Eapen, nor the cited locations in Columbus discloses all of the limitations of any of Applicants' claims individually, that no combination of the references discloses all of the limitations of any of Applicants' claims, and that the claims are consequently patentable over the references.

What Applicants are claiming

The independent claims in the present application are addressed to a method of analyzing a set of assets that uses what is termed in the Specification "MTTF reliability" (see [0013] (claim 1), to a method of optimizing a set of assets using what is termed "robust optimization" in the Specification ([0014], claim 4), and to a method of selecting a set of assets which combines selecting the set of assets using MTTF reliability and optimizing the weights of the assets in the selected sets (claim 10). Discussions of each of these claims follow:

Claim 1

As presently amended, this claim reads as follows:

> **1. (currently amended)** A method of analyzing a set of assets selected from a plurality thereof, historic returns data for the assets of the plurality being stored in storage accessible to a processor and
> the method comprising the steps performed in the processor of:
> receiving inputs indicating assets selected for the set and for each asset, a desired minimum return;
> using the historic returns data to determine a probability that at least one of the selected assets will not provide the desired minimum return indicated for the asset; and
> outputting the probability.

Support for claim 1 may be found in the discussion of MTTF reliability at [0097]-[0115] of Applicants' Specification. The claim is straightforward. The inputs are selected assets and a desired minimum return for each asset. Historic returns data for the selected assets are used "*to determine a probability that at least one of the selected assets will not provide the desired minimum return indicated for the asset*" (emphasis added). It is worth pointing out here that the *desired minimum return* is per-asset, not per-portfolio and that the probability is *not* that the *portfolio* will not provide a desired minimum return, but that an *asset* of the portfolio will not provide *the asset's* desired minimum return.

Claim 4

Claim 4 reads as follows:

> **4. (original)** A method of optimizing a set of assets, historic returns data for the assets being stored in storage accessible to a processor and the method comprising the steps performed in the processor of:
>
> receiving inputs indicating a set of scenarios for the set of assets, each scenario having values which are used in optimizing the set of assets and which vary stochastically between two extremes and a probability of occurrence for the scenario; and
>
> determining weights of the assets in the set such that the worst-case value of the set of assets is optimized over the set of scenarios.

Claim 4 is supported by the discussion of robust optimization at [0119]-[0151] of Applicants' Specification. Again, the claim is straightforward: what is claimed is "a method of optimizing a set of assets"; the optimization "determine[s] weights of the assets in the set such that the worst-case value of the set of assets is optimized over the set of scenarios"; each of the scenarios has "values which are used in optimizing the set of assets and which vary stochastically between two extremes". Also associated with each scenario is "a probability of occurrence for the scenario". The following details of the claim are particularly noteworthy in the present context:

- the optimization is for the "worst case value of the *set of assets* over the *set of scenarios*".
- each scenario has values "which are used in optimizing the *set of assets*".
- each scenario has a "probability of occurrence".

Claim 10

Claim 10 reads as follows:

> **10. (currently amended)** A method of selecting a set of assets from a plurality thereof and optimizing the weights of the assets in the set, historic returns data for assets being stored in storage accessible to a processor and
>
> the method comprising the steps performed in the processor of:
>
> 1) selecting a set of assets on the basis of a probability that at least one of the assets in a selected set will not provide a desired minimum return indicated for the asset; and
>
> 2) optimizing the weights of the assets in the selected set.

Again, the claim is straightforward. Step 1 of the claim selects a set of assets using the technique to which claim 1 is addressed and step 2 optimizes the weights of the assets in the selected set.

What the references disclose

The chief references are Bernhardt and Eapen, with Columbus being employed only to reject certain of the dependent claims.

Bernhardt

As set forth at [0005]-[0006] of the reference, Bernhardt discloses an improvement over risk assessments based on the Markowitz approach. In the improvement, Bernhardt replaces Markowitz' presumption that the price increments of the assets of a portfolio are random Gaussian variables with vectors which represent the actual evolution of the returns of the assets over a set of intervals belonging to a period of time [0007]-[0025].

Bernhardt discloses exemplary methods of analyzing investments using the vectors beginning at [0026]. Important characteristics of the methods for the present context are the following:

- The method determines weights of the portfolio's assets which will provide a minimum level of return r for the *entire portfolio* over each of the intervals of time [0029].
- The user of the method can further specify only the following parameters:
    - a constant C which controls the extent to which the return of the portfolio over an interval of time may be less than r [0030].
    - an optional desired mean return R for the portfolio [0029] .
    - an optional prediction of the future mean returns of the assets [0032].
- There is nothing in the method which corresponds to Applicants' MTTF; the user can only determine whether the return of the *entire portfolio* over an interval of time will satisfy r: the user cannot determine "a probability that at least one of the selected assets will not provide the desired minimum return indicated for the asset" (claim 1).

- The method is applied to individual portfolios; Bernhardt does not define scenarios which are variations of the behavior of the assets of the portfolio and consequently does not and cannot "determine[] weights of the assets in the set such that the worst case value of the set of assets is optimized over the set of scenarios" (claim 4).

Eapen

Eapen discloses a classic use of real options, namely allocating resources to projects in an organization over a period of time. Eapen's technique is well-described in overview at [0021] of Eapen:

> [0021] The current invention is a method and system to select projects from available projects and to allocate resources to departments to maximize the incremental value gained within a desired execution risk. According to one aspect of the present invention, the probability distribution of available capacity in each department is created using the Monte-Carlo simulation technique. Another aspect of the invention is the calculation of incremental value gained from each project using real options analysis. Another aspect of the invention is the creation of resource demand for the portfolio of selected projects at the department levels using the Monte-Carlo simulation technique. Yet another aspect of the invention is the selection of projects as well as allocation of capacity to departments in such a way that the incremental value gained by the organization is maximized within a desired level of execution risk.

The individual steps are described at [0022]-[0030]. Characteristics of Eapen's technique which are particularly relevant to the present context include the following:

- using Monte Carlo simulations to determine available departmental resources for projects and to determine resource demands for a given portfolio of projects over the period of time.
- using real options analysis to determine the incremental value of each project.
- using the resource demands and the available departmental resources to measure execution risk for a particular portfolio, i.e., the probability that a department or a group of departments will not have enough capacity to meet the resource demands from the particular portfolio of projects [0027].

- if the execution risk for the particular portfolio is above a threshold set for the analysis, the analyst removes projects from the portfolio, with projects having the smallest incremental value being removed first.
- if the execution risk is below the threshold, projects are added, with projects having the largest incremental value being added first.
- the execution risk is per-portfolio; further, how it is determined is a matter for the decision makers of the entity which is allocating resources to projects [0055].
- optimization for a particular execution risk is done by making a new portfolio of projects or by making a new allocation of resources for a particular portfolio.
- There is nothing in the method which corresponds to Applicants' MTTF; the execution risk indicates a probability that the entire portfolio of projects can be completed given the specified resources, not a probability that an individual investment asset will not "provide the desired minimum return indicated for the asset" (claim 1).
- There is nothing in the method which corresponds to Applicants' robust optimization. Eapen deals with possible future variations in the resources available for projects and in the resources required for a portfolio of projects by way of the Monte Carlo simulations; he does not define specific scenarios for resource availability and consequently does not and cannot do anything like "determin[ing] weights of the assets in the set such that the worst case value of the set of assets is optimized over the set of scenarios" (claim 4).

Columbus

As is well described by the Abstract, Columbus discloses a system for evaluating the performance of stock analysts, not a system for evaluating the performance of portfolios of investments:

> An analyst's performance is evaluated by utilizing information pertaining to at least one revision issued by the analyst involving at least one investment. This evaluation includes determining a conditional performance score indicative of the analyst's performance relative to other investors. The performance score is determined at least in part by considering an average historical performance of the investment, following the revision. In addition, the performance score is also

> determined using a historical consistency of the analyst's performances with respect to revisions involving the investment, and a number of revisions made by the analyst. Then, the performance score may be adjusted according to one or more adjustments, including adjustments for accentuating a number of issued revisions and a return amount, to generate a final performance score.

Given what Columbus discloses, it is not surprising that Examiner is not able to find much in Columbus that appears to be relevant to Applicants' inventions. Examiner cites paragraph [0007] of Columbus. That paragraph cites a further prior-art reference which is an investment analysis system. Examiner believes that the paragraph describes the use of real options; Applicants disagree, but the issue is moot because, as Examiner points out, Eapen and USSN 10/018,696 clearly do disclose the use of real options. Examiner further believes that FIG. 5c teaches "an objective function to take tax sensitivity into account". It appears from the description of the figure at [0293] that the only thing having to do with taxes in the figure is the "IT'S TAX TIME!" legend in the upper right hand corner of the figure:

> For instance, as shown in FIGS. *5c-5d*, other examples of revisions utilizable with embodiments of the present invention include detailed analyst recommendations on whether to sell, hold or buy a security 530, earnings surprises 532, estimates submitted 534, price/earnings 536, momentum, price/earning ratio, PIE and growth rates, and/or PEG ratio, and/or other similar information/estimates.

It should be pointed out here that what is meant by "revisions" in the foregoing and generally in Columbus is revisions in an analyst's estimation of the performance of an investment.

Given the size of the Columbus reference, its apparent general lack of relevance to Applicants' claims, and the lack of relevance of the specific locations cited by Examiner, Applicants are limiting their discussion of Columbus in the following to the locations cited by Examiner in her rejections.

Patentability of claims 1, 4, and 10 over either Bernhardt or Eapen separately and over any combination of Bernhardt, Eapen, and/or Columbus

Patentability of claims 1 and 10

As just set forth in the preceding discussions of Bernhardt and Eapen, neither reference discloses claim 1's

> using the historic returns data to determine a probability that at least one of the selected assets will not provide the desired minimum return indicated for the asset

Consequently, neither Bernhardt nor Eapen anticipates claim 1 and Examiner's rejections of the claim under 35 U.S.C. 102 are without foundation. Further, since neither of Bernhardt, Eapen, nor the cited locations in Columbus discloses the above limitation of claim 1, there is no combination of the references that can serve as an element of a rejection for obviousness under 35 U.S.C. 103. As Examiner will immediately see, the foregoing argument applies equally to rejections of claim 10 under either 35 U.S.C. 102 or 35 U.S.C. 103. Further, because claim 1 and claim 10 are patentable over the references, so are claims 2, 3, and 34 dependent from claim 1 and claims 11-33 and 35 dependent from claim 10.

Patentability of claim 4

As further set forth in the preceding discussions of Bernhardt and Eapen, neither reference discloses either claim 4's

> set of scenarios for the set of assets, each scenario having values which are used in optimizing the set of assets and which vary stochastically between two extremes and a probability of occurrence for the scenario

or the claim's

> a probability of occurrence for the scenario

or the claim's

> determining weights of the assets in the set such that the worst-case value of the set of assets is optimized over the set of scenarios.

Consequently, neither Bernhardt nor Eapen anticipates claim 4 and Examiner's rejections of the claim under 35 U.S.C. 102 are without foundation. Further, since neither of

Bernhardt. Eapen, nor the cited locations in Columbus discloses any of the above limitations, no combination of these references can serve as an element of a rejection of claim 4 for obviousness under 35 U.S.C. 103. Moreover, because claim 4 is patentable over the references, so are dependent claims 5-9.

Independent patentability of dependent claims

Certain of Applicants' dependent claims include additional limitations that are not disclosed in Bernhardt, Eapen, or the cited locations in Columbus and are consequently independently patentable over the references.

Claims 2, 3, and 11

None of the references disclose anything about analysis based on per-asset probabilities, and consequently, claims 2, 3, and 11 are independently patentable over the references.

Claims 5-9

The additional limitations of claim 5-9 further limit the step of optimizing over the set of scenarios. No "set of scenarios" is disclosed in the references, and claims 5 and 9 are consequently independently patentable over the references. The additional limitations of claims 6-8 further limit the "set of scenarios", and consequently, these claims are also independently patentable over the references.

Claims 13, 14, 17, and 18

The additional limitations of claims 13-14 and 17-18 involve robust optimization. Robust optimization is of course what is set forth in claim 4. As already demonstrated in with regard to claim 4, robust optimization is not disclosed in the references; consequently, claims 13-14 and 17-18 are independently patentable over the references.

Claims 27-32

Claim 27's additional limitation is that the objective function used in the optimization may be selected from a plurality of such functions; claims 28-32 set forth possible adjustments of the selected objective function. Columbus discloses nothing about

optimization; in Eapen there is no objective function, and in Bernhardt, there is only a single objective function; consequently, there is no disclosure in the references of claim 27's objective function that is selectable from a plurality of objective functions in the references or of the adjustments set forth in claims 28-32 and claims 27-32 are independently patentable over the references..

Claim 33

The additional limitation here is that a user may select one of a plurality of modes of quantifying the risk of an asset; the references only show single modes of so doing. Consequently, this claim, too, is independently patentable over the references.

Conclusion

Applicants have amended their claims, figures, and Specification to overcome Examiner's objections thereto and have demonstrated that the claims as amended are fully supported by the Specification as filed and that the amendments to the Figures and Specification add no new matter. Applicants have further traversed Examiner's rejections of the claims under 35 U.S.C. 101, 102, and 103. Applicants have thereby been fully responsive to Examiner's non-final Office action of 11/7/2008 as required by 37 C.F.R. 1.111(b) and respectfully request that Examiner enter the amendment and continue with her examination, as provided by 37 C.F.R. 1.111(a). A petition and fee for a two-month extension of time accompanies this amendment. No other fees are believed to be required. Should any be, please charge them to Deposit Account number 501315. Any overpayments should be credited to that account.

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